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(51) INT CL<sup>7</sup>

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(56) Documents Cited

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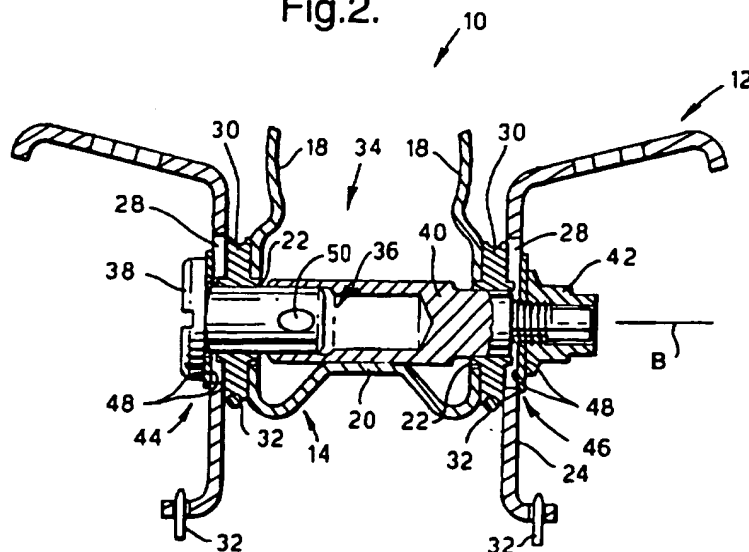
Online:WPI,EPODOC,JAPIO

(54) Abstract Title

Clamping device for a steering column

(57) A clamping device 10 for the steering column of a motor vehicle comprises a first bracket 12 securable to the vehicle and having a pair of spaced arms 24 with elongate apertures 28; a second bracket 14 securable to the steering column or a jacket (16, Fig.1) therefor and having a pair of spaced arms 18 with elongate apertures 22, apertures 22 being substantially perpendicular to apertures 28; and a clamping mechanism 34 including a bolt 36 and a nut 42, clamping and release of the column being effected by rotating the bolt relative to the nut. The clamping mechanism further includes washers 44,46 having a roughened surface or surfaces 48 to provide increased frictional grip. The washers are formed by rolling pieces stamped from rolled, sheet material (e.g. steel, aluminium or brass) in a drum containing a roughening material (e.g. aluminium oxide or silica balls). Alternatively, the surfaces are roughened by sand-blasting.

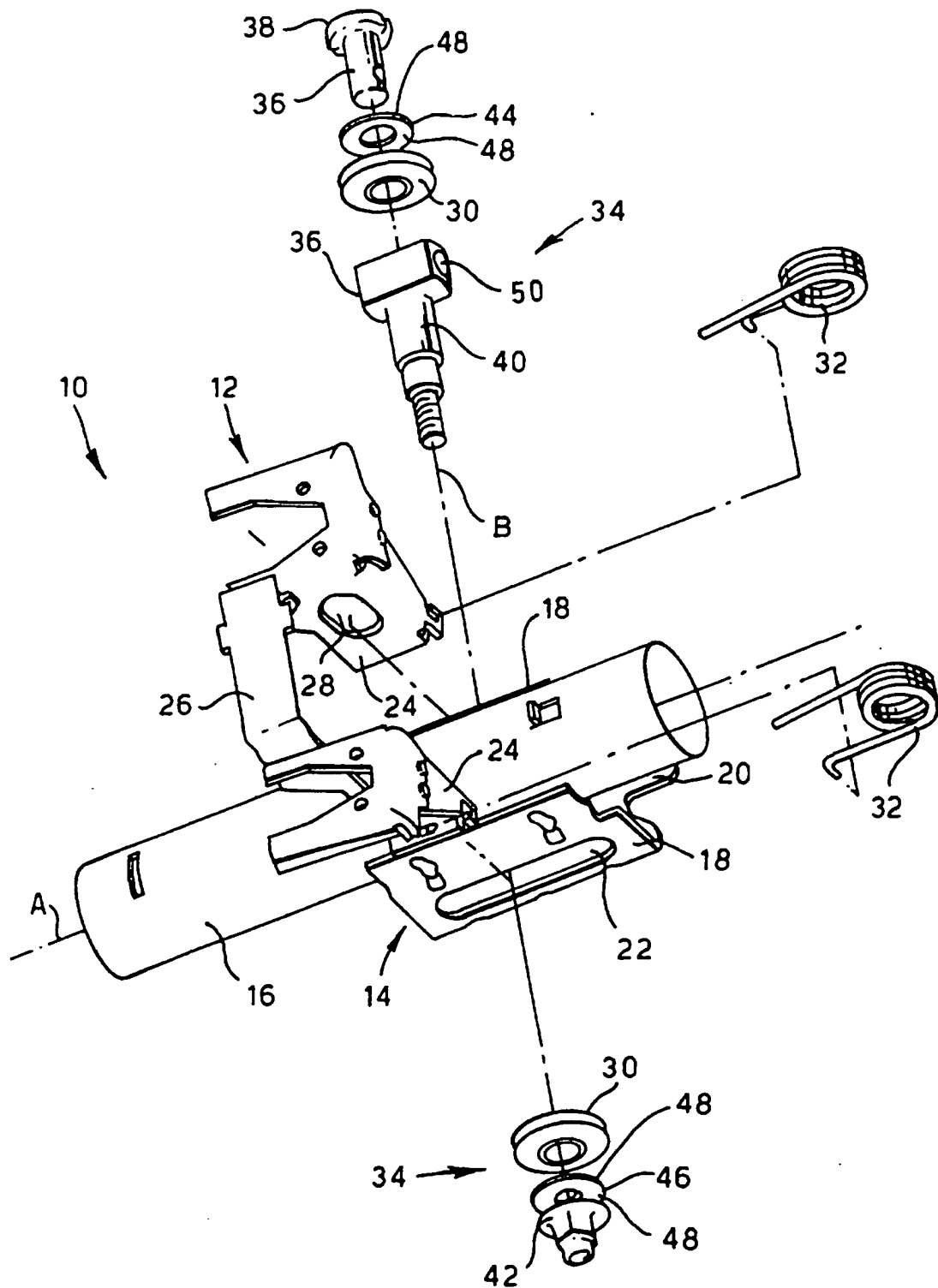
Fig.2.

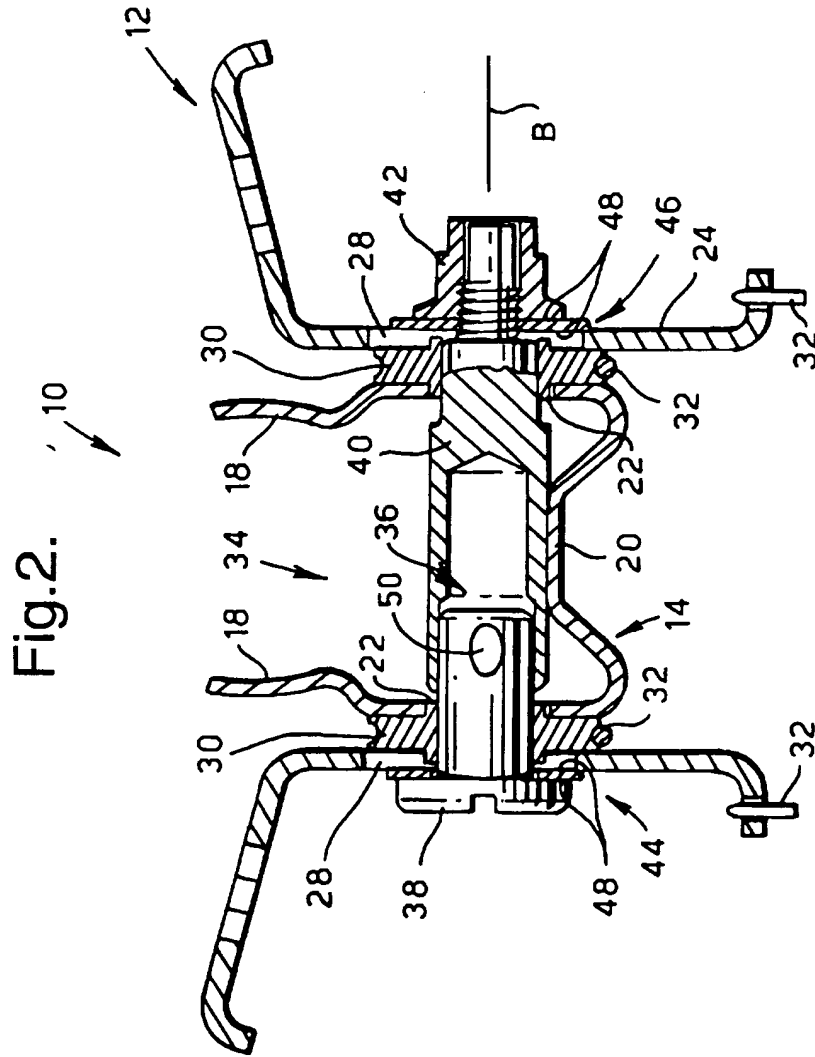


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Fig. 1.





## CLAMPING DEVICE FOR A STEERING COLUMN

### Technical Field

5                   The present invention relates to a clamping device for the steering column of a motor vehicle, and in particular to a clamping device which allows the steering column to rake and telescope relative to the vehicle body.

### 10   Background of the Invention

                  It is known to provide a clamping device for a steering column which allows the steering column to rake and telescope relative to the vehicle body. The clamping device generally comprises a first bracket which is secured to the vehicle body, and a second bracket which is secured to the steering column. The first and second brackets are secured together by a  
15                   clamping mechanism including a bolt and a nut, with the bolt passing through aligned apertures in the first and second brackets. The apertures in the first bracket are shaped to allow the steering column to have a rake movement (height adjustment or tilt) when the clamping mechanism is loose. The  
20                   apertures in the second bracket are shaped to allow the steering column to telescope (move in an axial direction) when the clamping mechanism is loose.

### Summary of the Invention

                  The object of the present invention is to provide an  
25                   improvement to this previously known arrangement.

                  A clamping device in accordance with the present invention for the steering column of a motor vehicle, comprises a first bracket securable to the vehicle, the first bracket having a pair of spaced arms, each arm having an elongate aperture, the apertures being substantially aligned; a second bracket  
30                   securable to the steering column, the second bracket having a pair of spaced arms, each arm having an elongate aperture, the apertures being substantially

aligned; each arm of the first bracket being positioned adjacent one of the arms of the second bracket, with the apertures in the arms of the first bracket being at an angle to the apertures in the arms of the second bracket; and a clamping mechanism including a bolt member having an enlarged head and a threaded shank extending through the apertures in the arms of the first and second brackets, a nut threaded on the shank, the bolt being rotatable about its axis relative to the nut between a clamped position of the clamping mechanism in which the arms of the bracket frictionally engage, and a release position in which the arms are frictionally disengaged; the clamping mechanism further including a washer having a surface engageable with one of the arms of the first bracket or the second bracket in the clamped position, the surface being roughened.

The present invention provides a clamping device in which the holding load or torque of the clamping mechanism is increased simply and cheaply.

#### Brief Description of the Drawings

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

Figure 1 is an exploded view of a clamping device in accordance with the present invention; and

Figure 2 is a cross-sectional view of the clamping device of Figure 1 with the jacket omitted for clarity.

#### Description of the Preferred Embodiment

Referring to the drawings, the clamping device 10 of the present invention is for use with a steering column (not shown) of a motor vehicle. The clamping device 10 is such as to allow the steering column to rake and/or telescope relative to the vehicle body (not shown) on which the column is mounted.

The clamping device 10 comprises a first bracket 12 which, in use, is secured to the vehicle body in any suitable arrangement; and a second bracket 14 which is secured (in any suitable manner) to a tubular jacket 16. In use, the jacket 16 surrounds, and is secured to, a portion of the steering column. The jacket 16 has a longitudinal axis A.

The second bracket 14 includes a pair of spaced arms 18 which are positioned on either side of the jacket 16 and are connected by a base member 20. Each arm 18 of the second bracket 14 has an elongate aperture 22 formed therein which extends in a direction substantially parallel to the axis A. The apertures 22 are substantially aligned.

The first bracket 12 includes a pair of spaced arms 24, each of which is positioned adjacent one of the arms 18 of the second bracket 14. The arms 24 of the first bracket 12 are preferably connected by a bridge member 26. Each arm 24 of the first bracket 12 has an elongate aperture 28 formed therein which extends in a direction at an angle to, and substantially perpendicular to, the aperture 22 in the adjacent arm 18 of the second bracket 14. The apertures 28 are substantially aligned.

An annular spacer 30 is positioned between the adjacent arms 24,18 of the first and second brackets 12,14. The spacers 30 are substantially aligned with the apertures 22,28 in the arms 18,24. A spring 32 extends between each spacer 30 and the adjacent arm 24 of the first bracket 12.

A clamping mechanism 34 is used to releasably clamp the first and second brackets 12,14. The clamping mechanism 34 comprises a bolt member 36 having an enlarged head 38 and a threaded shank 40, and a nut 42 threaded to the shank of the bolt member. The head 38 and the shank 40 of the bolt member 36 may be separately formed, as shown, and then secured together, or the head and shank may be formed in one piece. The bolt member 36 extends through the aligned apertures 28,22 in the first and second brackets, and through the spacers 30. The head 38 is positioned adjacent one of arms 24 of the first bracket 12, and the nut 42 is positioned adjacent the other of the arms of the first bracket. A first washer 44 is positioned between

the head 38 and the adjacent arm 24 of the first bracket 12. A second washer 46 is positioned between the nut 42 and the adjacent arm 24 of the first bracket 12.

In the clamped position of the clamping mechanism 34 as shown in Figure 2, the arms 24,18 of the first and second brackets 12,14 are in frictional engagement either directly or by way of the spacers 30 when present. In order to release the clamping effect, the bolt member 36 is rotated in a first direction about its axis B (for example, by way of a lever, not shown, passing through an aperture 50 in the shank 40) relative to the nut 42 to move the clamping mechanism to a release position. In the release position, the first bracket 12 can be moved in a telescope direction and/or a rake direction relative to the second bracket 14. The clamping mechanism 34 is moved back to the clamped position by reversing the direction of rotation of the bolt member 36 about the axis B relative to the nut 42.

One or both surfaces 48 of the first washer 44 and/or the second washer 46 are roughened. On moving the clamping mechanism 34 to the clamped position, the roughened surface or one of the roughened surfaces 48 of the or each washer 44,46 engages the adjacent arm 24 of the first bracket 12 to provide a frictional grip. Compared to the use of washers with smooth surfaces, or no washers, the clamping mechanism 34 of the present invention provides an increase in clamping or holding load or torque, between the arms 24,18 of the first and second brackets 12,14 for the same clamping force.

The or each washer 44,46 is preferably formed by hot or cold rolling a sheet of suitable material (such as steel, aluminium, or brass), stamping the sheet to form the outline shape of the washers, and then placing the stamped pieces in a rotating drum containing a roughening medium (such as aluminium oxide granules or silica balls) for a predetermined time. The time spent in the rotating drum determines the amount of roughening of the surfaces 48 of the stamped pieces in forming the washers 44,46. The time is therefore determined dependent on the required holding load or torque

required by the clamping mechanism 34. In an alternative method, the roughened surfaces 48 may be formed by sand-blasting.

The present invention provides a clamping device with an increased clamping load or torque in a simple and easy manner, without the  
5 need for complicated friction plates. In an alternative arrangement, one or both washers 44,46 may be positioned between the spacer 30 and the adjacent arm 24 of the first bracket 12 or the adjacent arm 18 of the second bracket 14, with the roughened surface 48 in engagement with the adjacent arm.



Claims

1. A clamping device for the steering column of a motor vehicle comprising a first bracket securable to the vehicle, the first bracket having a pair of spaced arms, each arm having an elongate aperture, the apertures being substantially aligned; a second bracket securable to the steering column, the second bracket having a pair of spaced arms, each arm having an elongate aperture, the apertures being substantially aligned; each arm of the first bracket being positioned adjacent one of the arms of the second bracket, with the apertures in the arms of the first bracket being at an angle to the apertures in the arms of the second bracket; and a clamping mechanism including a bolt member having an enlarged head and a threaded shank extending through the apertures in the arms of the first and second brackets, and a nut threaded on the shank, the bolt being rotatable about its axis relative to the nut between a clamped position of the clamping mechanism in which the arms of the bracket frictionally engage, and a release position in which the arms are frictionally disengaged; the clamping mechanism further including a washer having a surface engageable with one of the arms of the first bracket or the second bracket in the clamped position, the surface being roughened.

2. A clamping device as claimed in Claim 1, wherein the washer is positioned between the enlarged head and the arm adjacent the head; and another washer is positioned between the nut and the arm adjacent the nut, the other washer having a roughened surface engageable with the adjacent arm.

3. A clamping device as claimed in Claim 1, wherein the washer is positioned between one of the arms of the first bracket and one of the arms of the second bracket.

4. A clamping device as claimed in any one of Claims 1 to 3, wherein the arms of the first bracket are positioned outside the arms of the second bracket.

5. A clamping device as claimed in any one of Claims 1 to 4, wherein an annular spacer is positioned between the adjacent arms of the first and second brackets, each spacer being aligned with the apertures in the arms.

6. A clamping device as claimed in any one of Claims 1 to 5, wherein the arms of the first bracket are connected by a bridge member.

7. A clamping device as claimed in any one of Claims 1 to 6, wherein the arms of the second bracket are connected by a base member, and secured to a tubular jacket for supporting the steering column, the apertures in the arms of the second bracket extending in a direction substantially parallel to the axis of the jacket.

8. A method of forming a washer for use in a clamping device as claimed in any one of claims 1 to 7, comprising rolling a sheet of material; stamping the sheet to form pieces having an outline corresponding to the required washer; and rolling the stamped pieces in a drum containing a roughening material for a predetermined time to roughen at least one surface of the washer.

9. A method as claimed in Claim 8, wherein the roughening material is aluminium oxide granules or silica balls.

10. A clamping device substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.



Application No: GB 9916924.5  
Claims searched: 1-7

Examiner: Peter Squire  
Date of search: 12 January 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): F2Y YSQ

Int Cl (Ed.7): B62D 1/18

Other: Online:WPI,EPODOC,JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2259132 A (Torrington) see washers 10/11	
A	EP 0856451 A1 (Fuji Kiko) see col.4 lines 41-44	
A	EP 0606085 A1 (Lemfoerder Metallwaren) see washers 13, 14	
A	WO 95/25032 A1 (Torrington) see washers 7, 10	
A	US 4774851 (Koyo Seiko) see col.4 lines 6-14	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.